DOCUMENT RESUME

ED 479 176 SO 035 104

AUTHOR	Hill, Miriam Helen
TITLE	Destroying the Art of Cartography: Teaching Illustrations Using ArcView.
PUB DATE	2003-03-00
NOTE	75p.; Paper presented at the Annual Meeting of the Association of American Geographers (99th, New Orleans, LA, March 5-8, 2003).
PUB TYPE	Guides - Classroom - Teacher (052) -- Opinion Papers (120) -- Speeches/Meeting Papers (150)
EDRS PRICE	EDRS Price MF01/PC04 Plus Postage.
DESCRIPTORS	*Cartography; Diagrams; Geographic Concepts; Geography; Higher Education; *Illustrations; *Layout (Publications); *Maps; Secondary Education
IDENTIFIERS	*Choropleth Maps; *Geographic Information Systems; Microsoft PowerPoint

ABSTRACT

Introductory courses in Geographic Information Systems and cartography cover the fundamentals of map design. Students are given guidelines for producing a good map, but visual demonstrations are much more impressive. ArcView was used to produce illustrations of bad mapping practices and placed in a Microsoft PowerPoint presentation to demonstrate poor cartographic design. This booklet consists of a choropleth map showing the total number of registered automobiles, 33 variations of this map, and descriptions of common map layout and design errors. (BT)

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Destroying the Art of Cartography:
Teaching Illustrations Using ArcView

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Paper presented at the annual meeting of the
Association of American Geographers,
New Orleans, Louisiana,
March 6, 2003.

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Destroying the Art in Cartography: Teaching Illustrations Using ArcView, Miriam Helen Hill, Jacksonville State University

Introductory courses in GIS and cartography cover the fundamentals of map design. The students may be told guidelines for producing a good map, but visual demonstrations are much more impressive. ArcView was used to produce illustrations of bad mapping practices and placed in a PowerPoint presentation to demonstrate poor cartographic design.

The presentation, "Destroying the Art in Cartography: Mapping Don'ts," consists of a choropleth map showing the total number of registered automobiles, thirty-three variations of this map, and descriptions of common map layout and design errors. This presentation will be available on line at http://www.jsu.edu/depart/geography/mhill/cart/badmaps.ppt.

cartography education, map design, layouts

Destroying the ART in ~~CARTO~~GRAPHY: Mapping DON'TS

by Dr. Miriam Helen Hill
Jacksonville State University
Jacksonville, Alabama

The purpose of mapmaking centers upon the communication of spatial patterns.

This is best done by maps that have been carefully planned and designed.

Poor layout can destroy an otherwise high quality map product.

A choropleth map of the total number of registered automobiles illustrates errors in map layout and design.

First, the basic map…..

Note: The north arrow should be turned about 6°, and the legend labels should have been larger.

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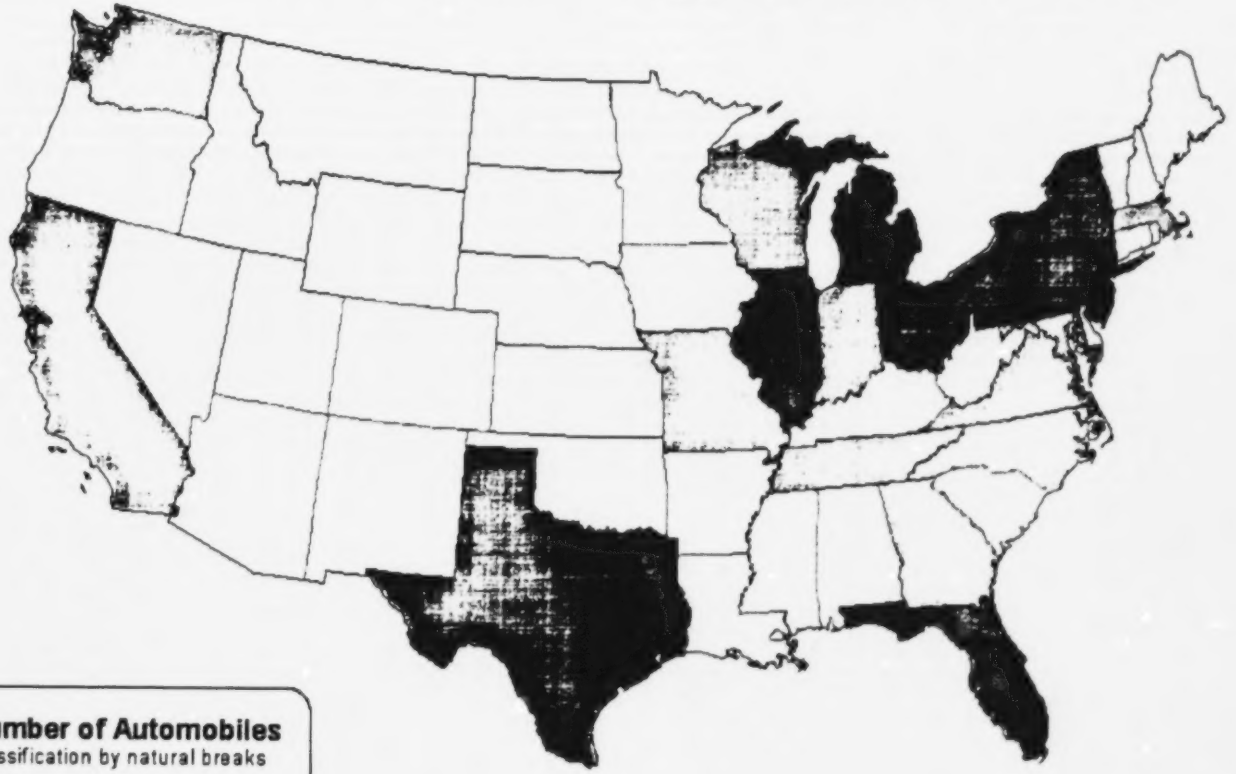
U.S. Automobile Registration: 1999



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data from WWW at: http://www.fhwa.dot.gov/////////ohim/hs99/mvpage.htm
Excel file format at: http://www.fhwa.dot.gov/////////ohim/hs99/excel/mv1.xls
mapped with ArcView GIS Albers Equal Area Projection

The five map essentials for a good map are:

TITLE

LEGEND

SCALE

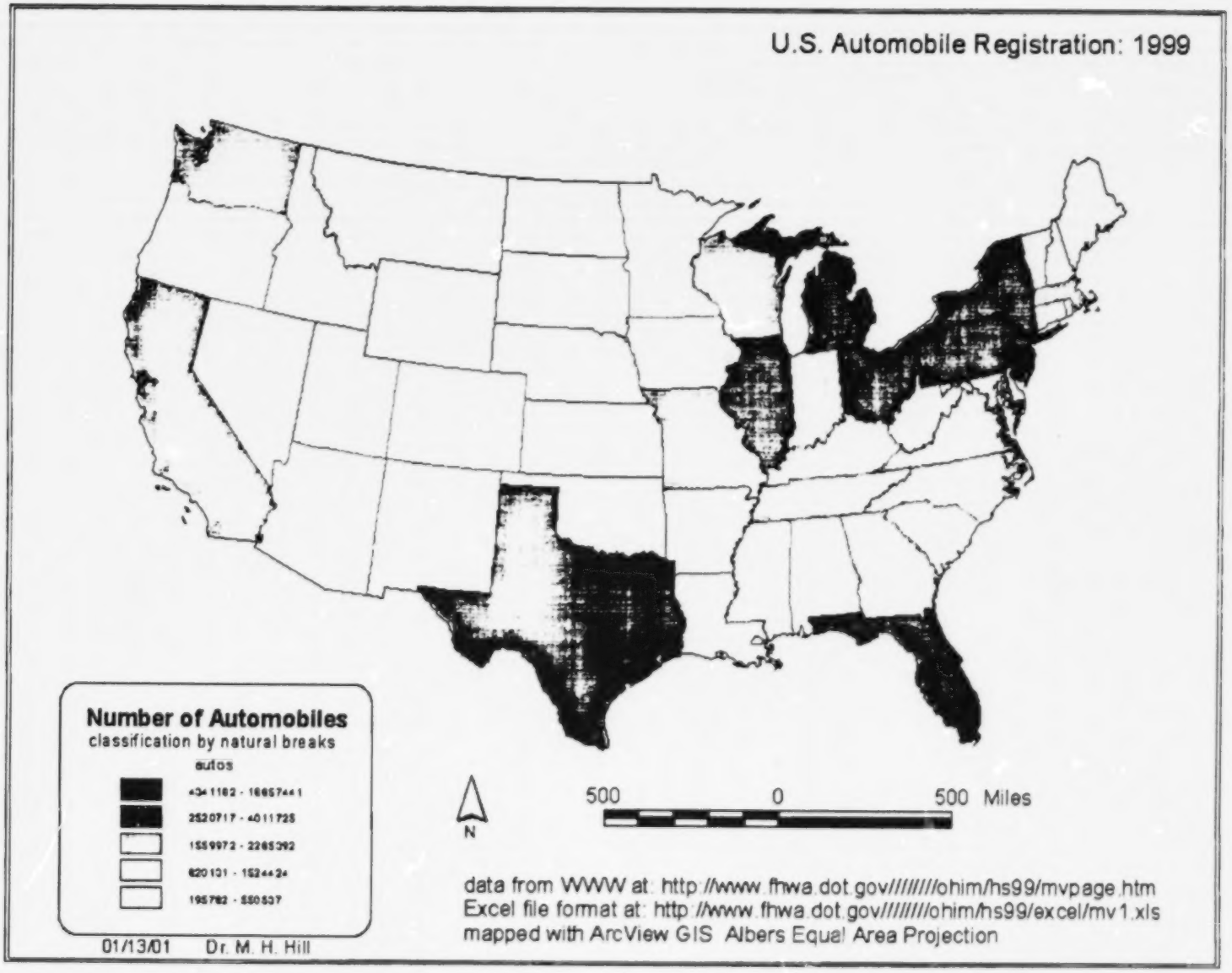
DIRECTION

DATE

Generally, the title should be large, bold, and centered above the map.

In particular cases, a title may be below the map. Usually this indicates the title is of little importance.

In special design cases, the title may be to the left or to the right. This must be done carefully and cautiously.


U.S. Automobile Registration: 1999
Number of Automobiles
classification by natural breaks
autos
434 1182 - 1665744
252 0717 - 4011725
155 9972 - 2265292
62 0131 - 152424
19 5782 - 55 0537
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N
500 0 500 Miles
data from WWW at: http://www.fhwa.dot.gov/////ohim/hs99/mvpage.htm
Excel file format at: http://www.fhwa.dot.gov/////ohim/hs99/excel/mv1.xls
mapped with ArcView GIS Albers Equal Area Projection

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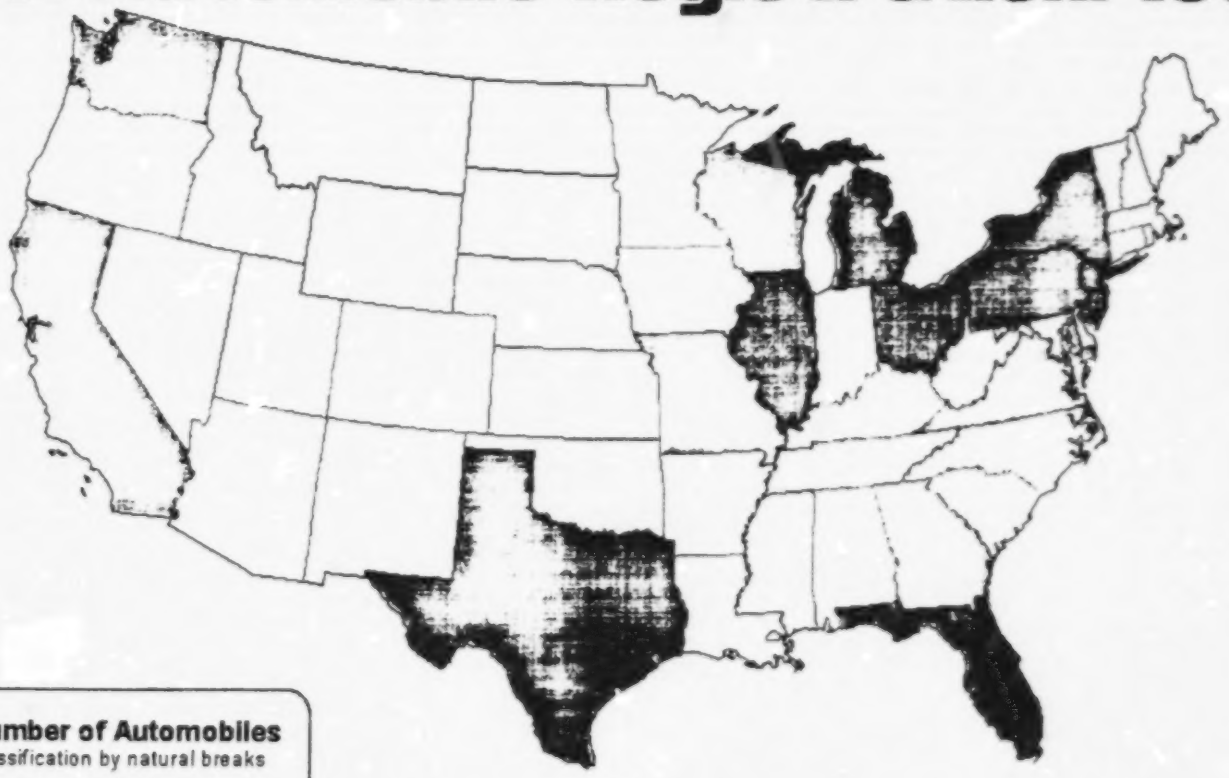
The title should not be so large that it dwarfs or overpowers the map.

While it needs to be dark and strong, an excess also can overpower the map.

U.S. Automobile Registration: 1999



Number of Automobiles
classification by natural breaks
autos

	4341182 - 18657441
	2520717 - 4011725
	1559972 - 2285392
	820131 - 1524424
	195782 - 550537

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N

500 0 500 Miles

data from WWW at: http://www.fhwa.dot.gov/////////ohim/hs99/mvpage.htm
Excel file format at: http://www.fhwa.dot.gov/////////ohim/hs99/excel/mv1.xls
mapped with ArcView GIS Albers Equal Area Projection

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The font of the title should be plain rather than fancy or decorative. The character must be appropriate for the map.

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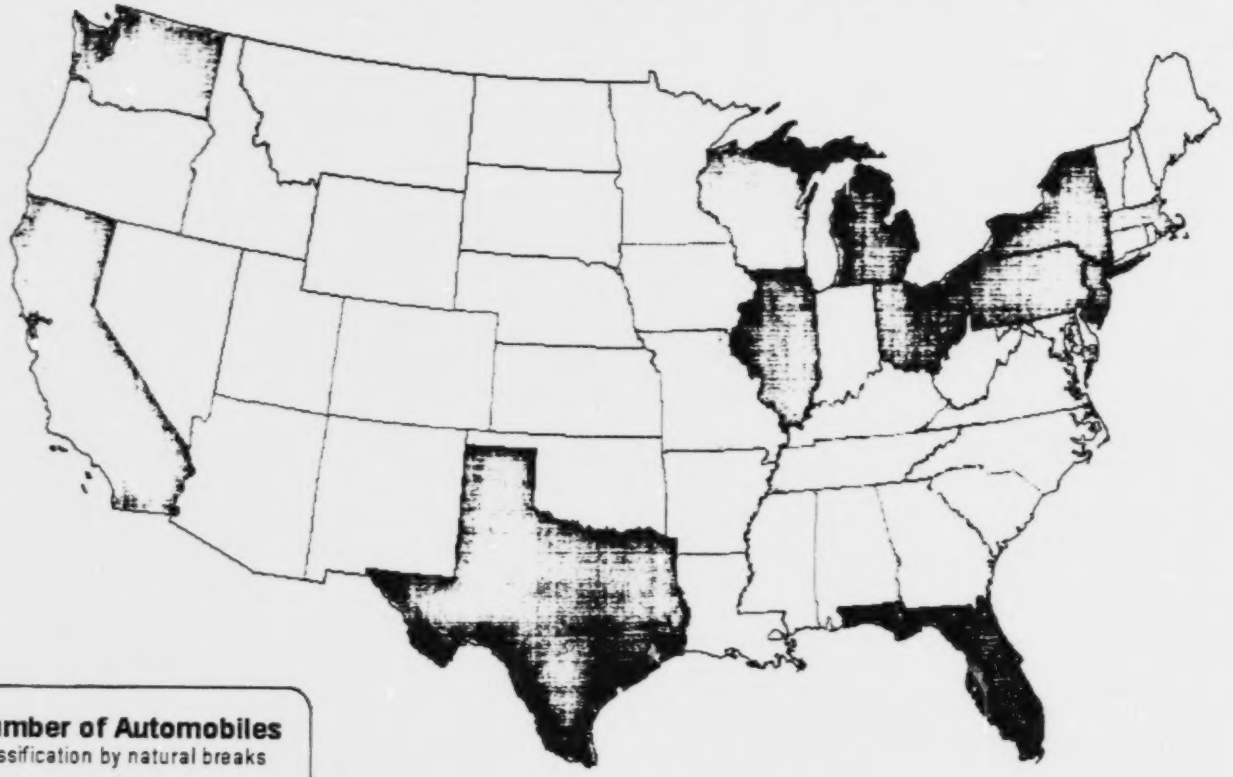
U.S. AUTOMOBILE REGISTRATION: 1999



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mapped with ArcView GIS Albers Equal Area Projection

The title should tell

WHAT

WHERE

and

WHEN

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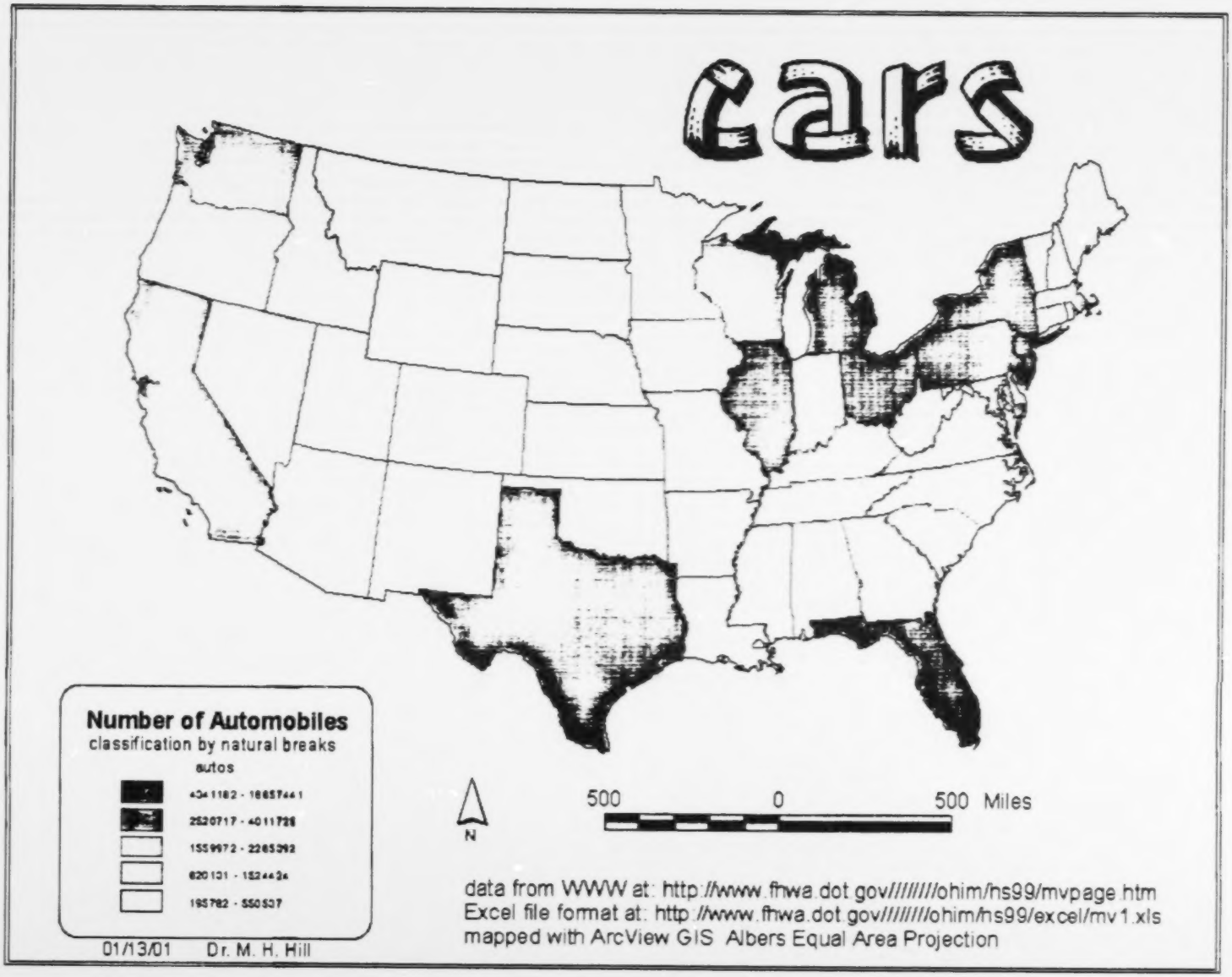

The legend should be clear and detailed with distinct categories and symbols.

An appropriate amount of generalization is needed.

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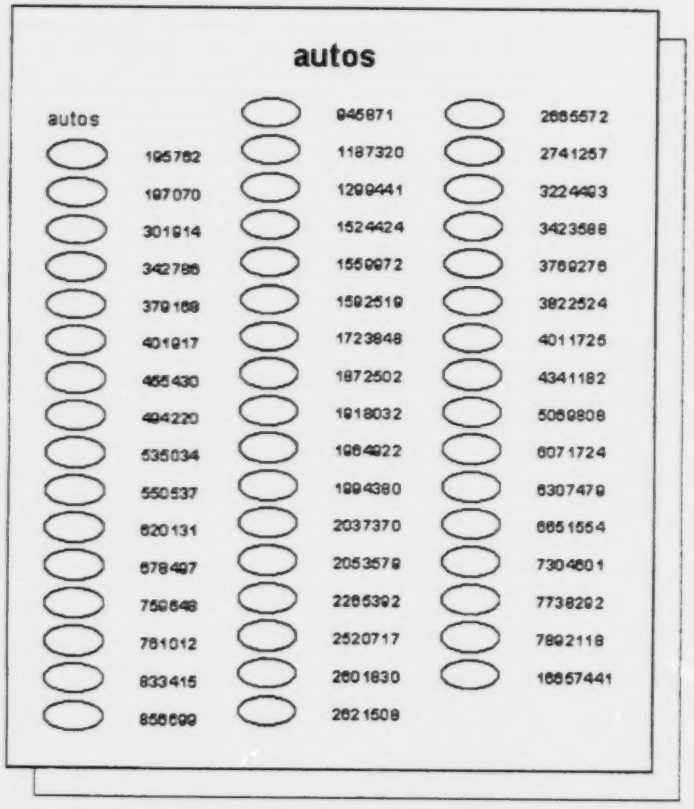

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The legend should give needed details about the symbols and be clearly and easily legible.

It should describe what values are mapped and how these values were classified.

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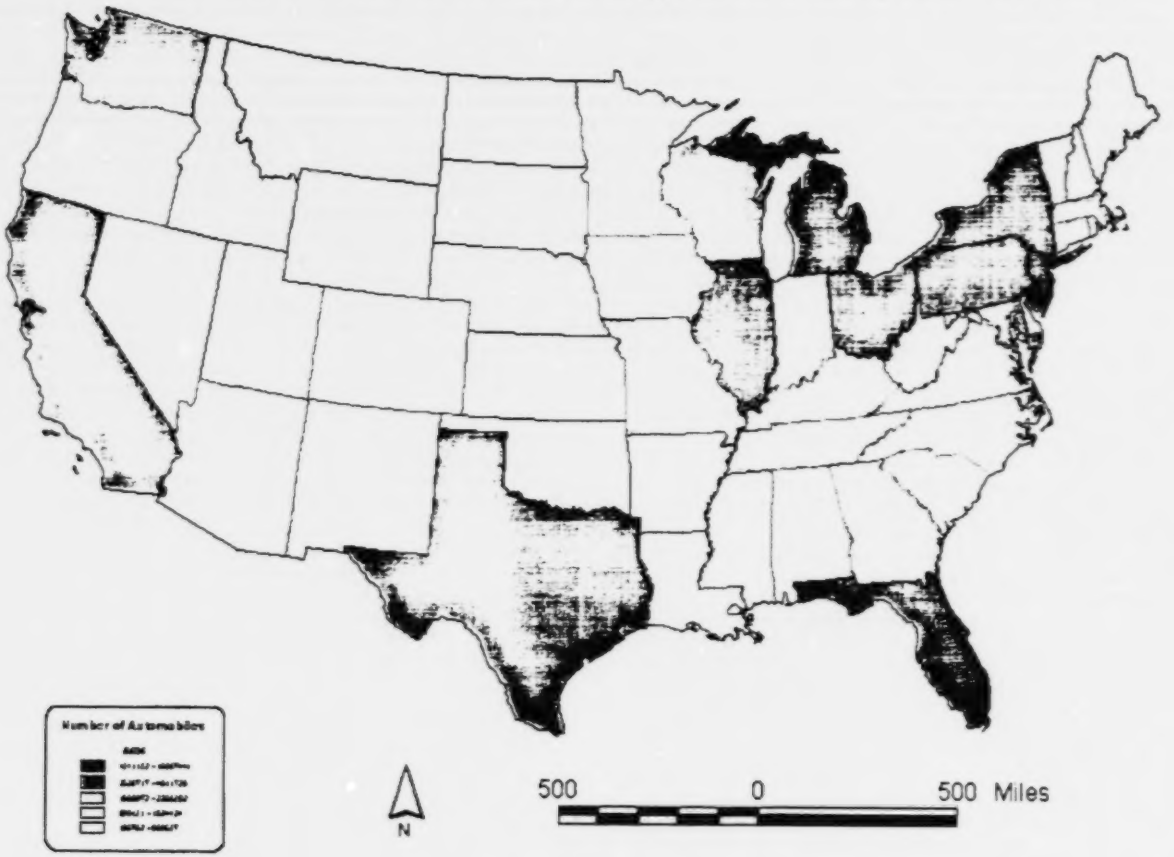

data from WWW at: http://www.fhwa.dot.gov/////////ohim/hs99/mvpage.htm
Excel file format at: http://www.fhwa.dot.gov/////////ohim/hs99/excel/mv1.xls
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Conventional colors and symbols should be used.

The legend should promote visual harmony and balance.

White usually indicates a low value or no data.

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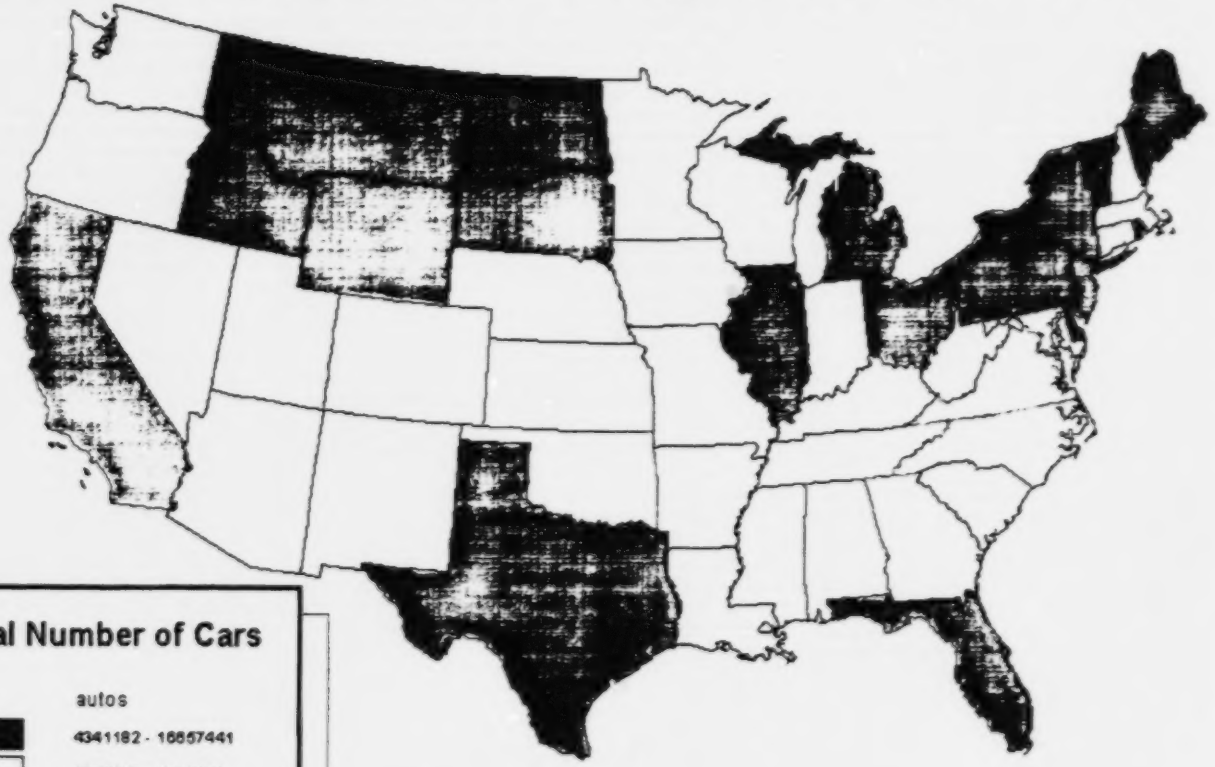

data from WWW at: http://www.fhwa.dot.gov/////////ohim/hs99/mvpage.htm
Excel file format at: http://www.fhwa.dot.gov/////////ohim/hs99/excel/mv1.xls
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The legend should be placed in an area where it will not interfere with the map.

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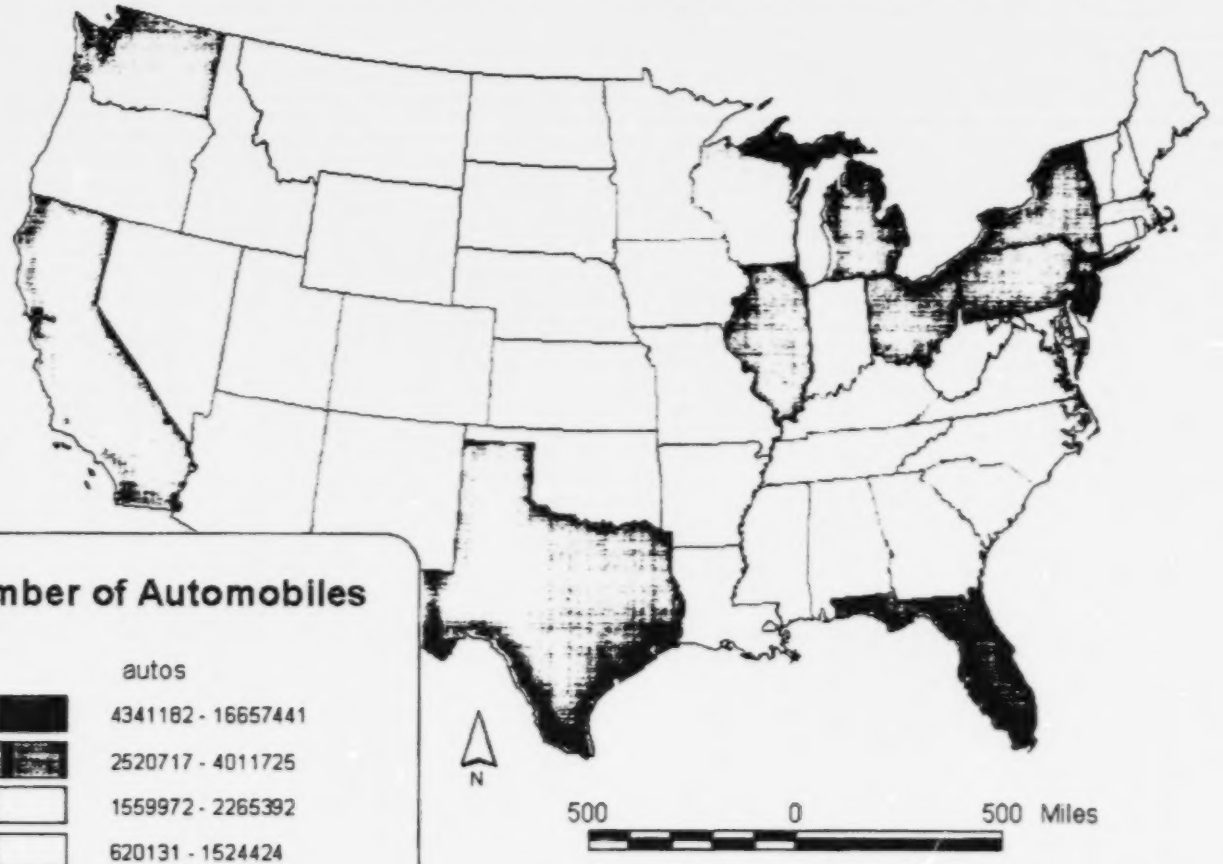

data from WWW at: http://www.fhwa.dot.gov/////////ohim/hs99/mvpage.htm
Excel file format at: http://www.fhwa.dot.gov/////////ohim/hs99/excel/mv1.xls
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The legend should be prominent but peripheral on the map page.

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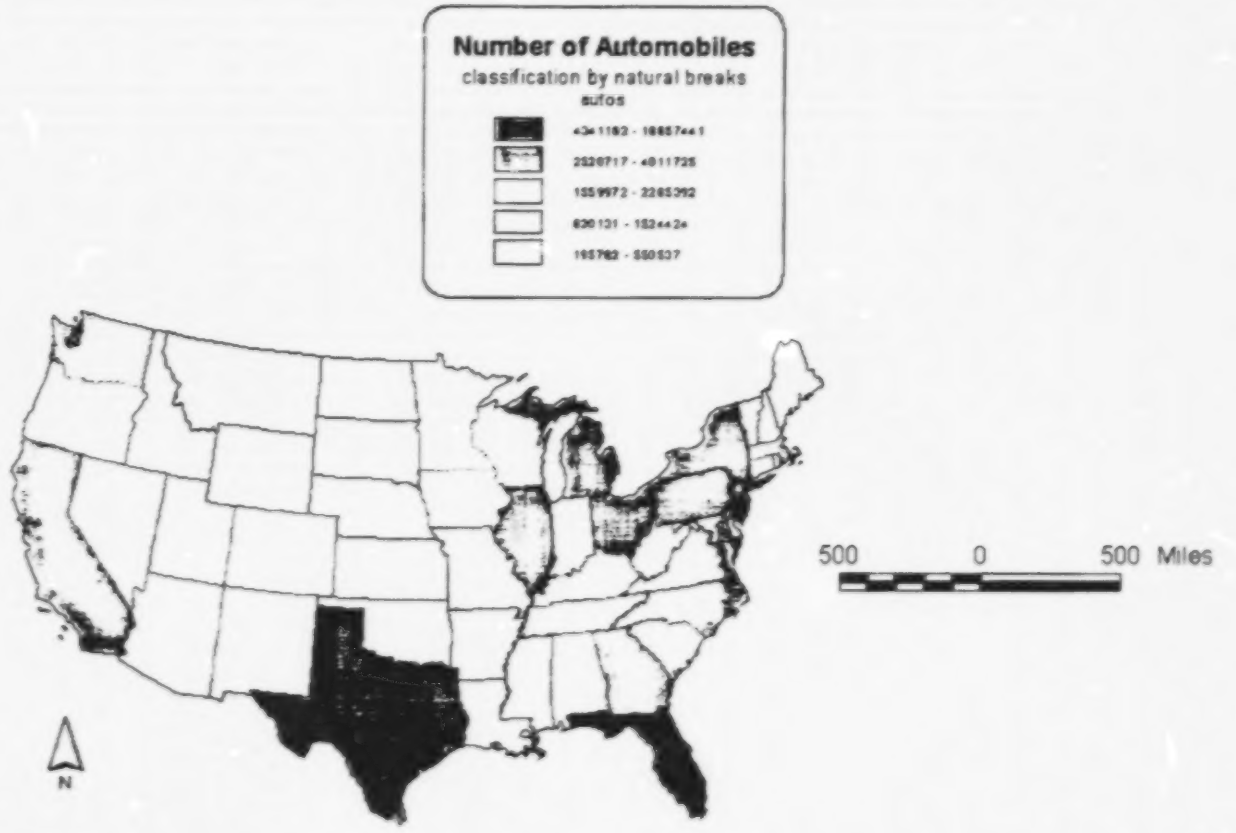

data from WWW at: http://www.fhwa.dot.gov/////ohim/hs99/mvpage.htm
Excel file format at: http://www.fhwa.dot.gov/////ohim/hs99/excel/mv1.xls
mapped with ArcView GIS Albers Equal Area Projection

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The scale should be given as a graphic scale, because reproduction will change the scale in the same order as it changes the map.

The graphic scale should be properly designed to facilitate use.

Verbal and RF scales, when given, should easily and clearly communicate to the map user.

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The scale should have an appropriate boldness and not overpower the map.

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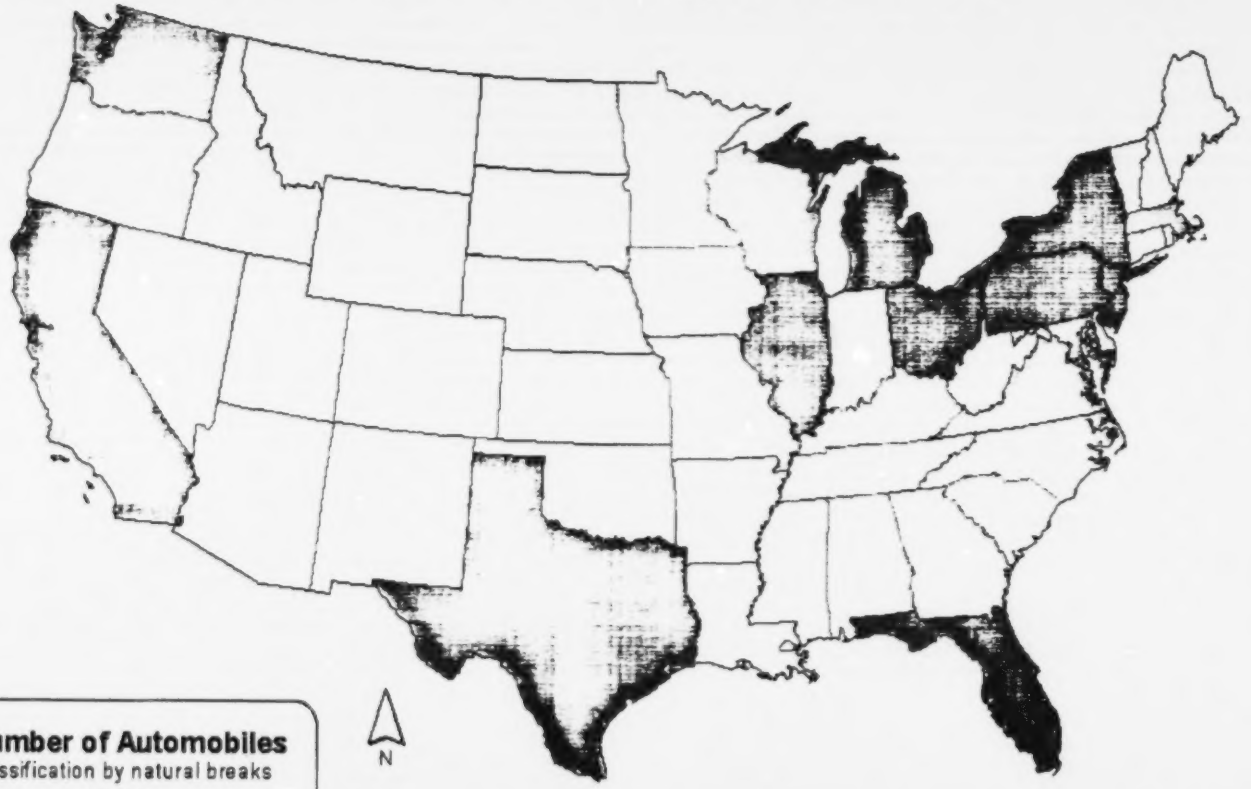

data from WWW at: http://www.fhwa.dot.gov/////////ohim/hs99/mvpage.htm
Excel file format at: http://www.fhwa.dot.gov/////////ohim/hs99/excel/mv1.xls
mapped with ArcView GIS Albers Equal Area Projection

Several graphic scales can be given, but care should be taken in design and placement.

The design should be consistent.

The scales should be grouped together.

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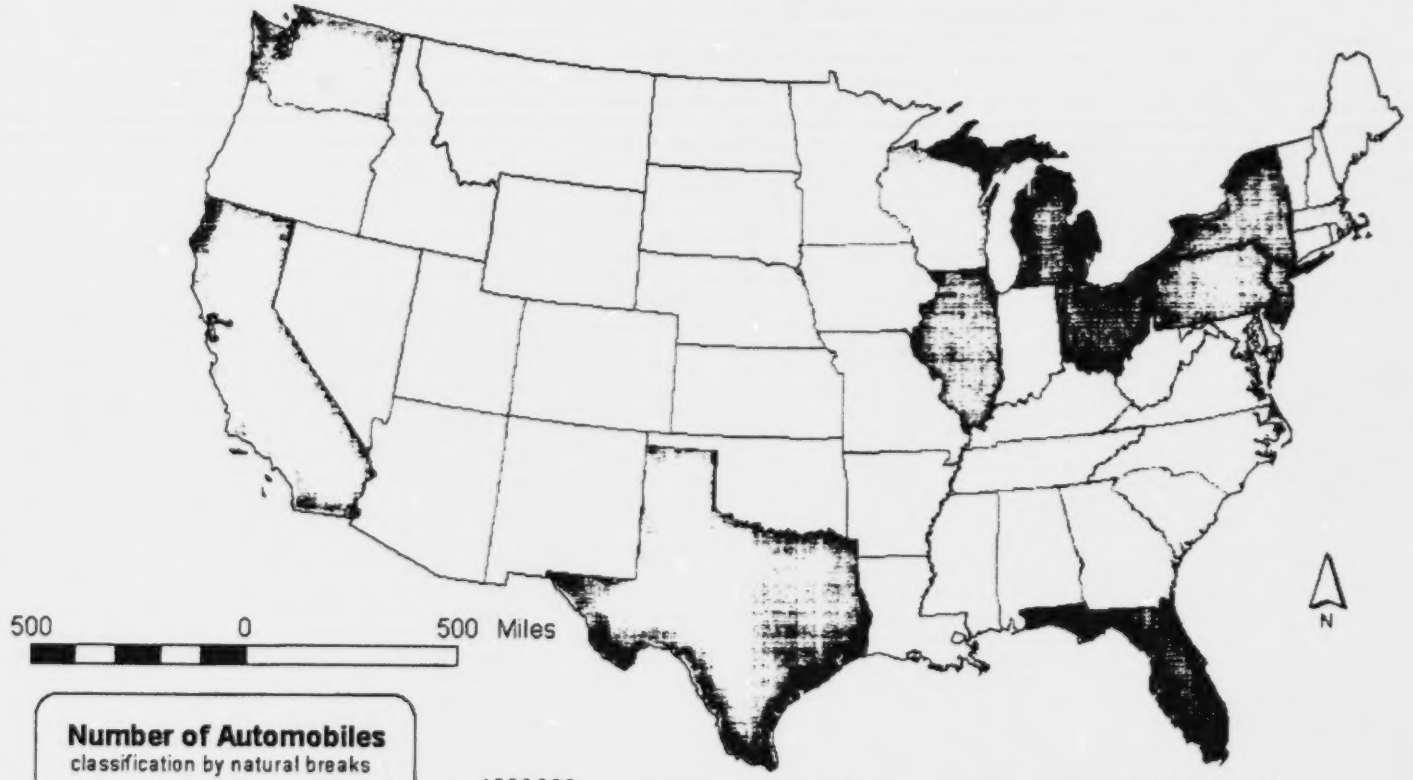
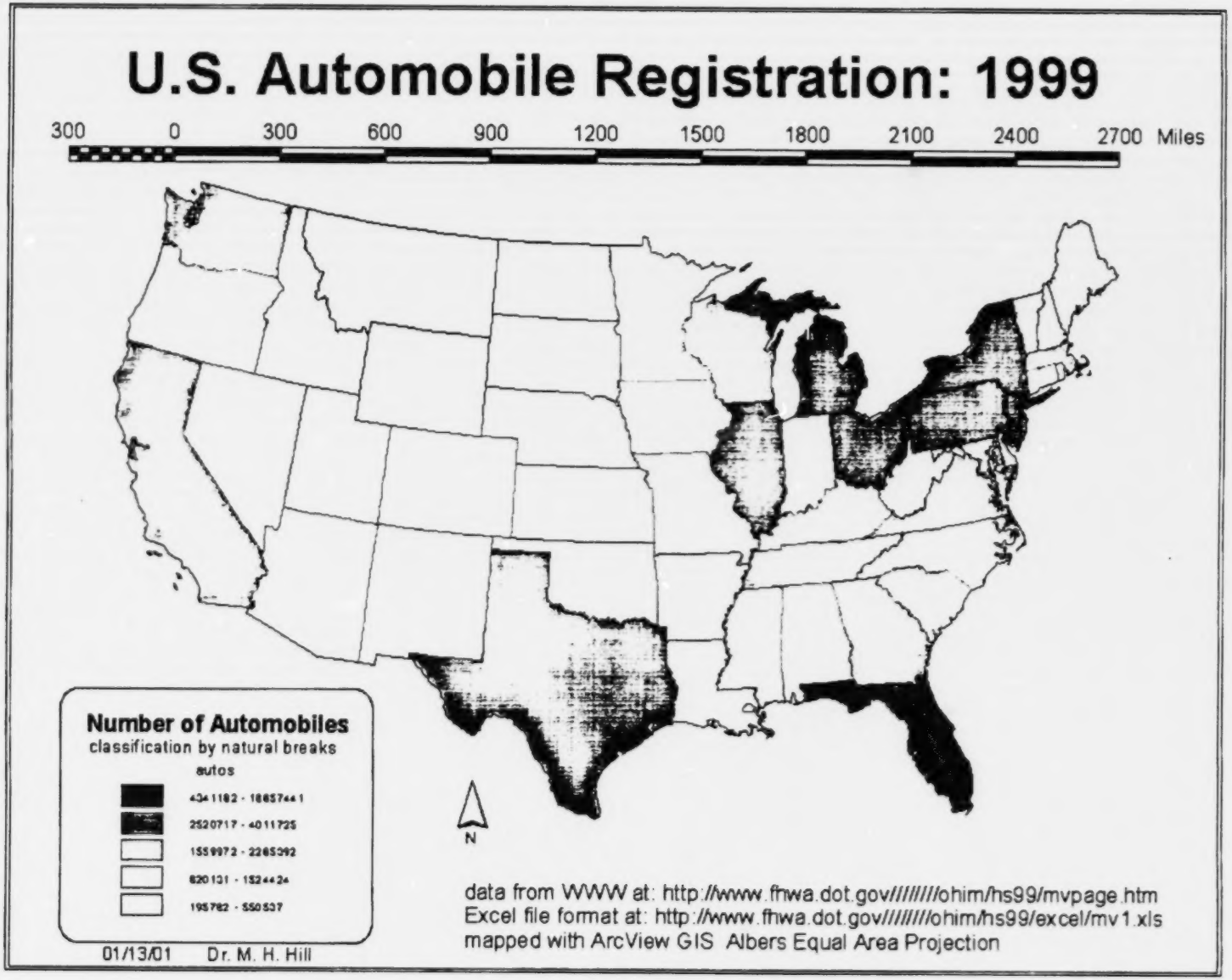


The scale should not be placed in a prominent position.


U.S. Automobile Registration: 1999
300 0 300 600 900 1200 1500 1800 2100 2400 2700 Miles
Number of Automobiles
classification by natural breaks
autos
4341182 - 18657441
2520717 - 4011725
1559972 - 2265392
820131 - 1524424
195782 - 550537
N
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Excel file format at: http://www.fhwa.dot.gov/////////ohim/hs99/excel/mv1.xls
mapped with ArcView GIS Albers Equal Area Projection

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The date of the data and the date of production should be provided.

This is crucial information, because it identifies when the data represent and when the data were obtained.

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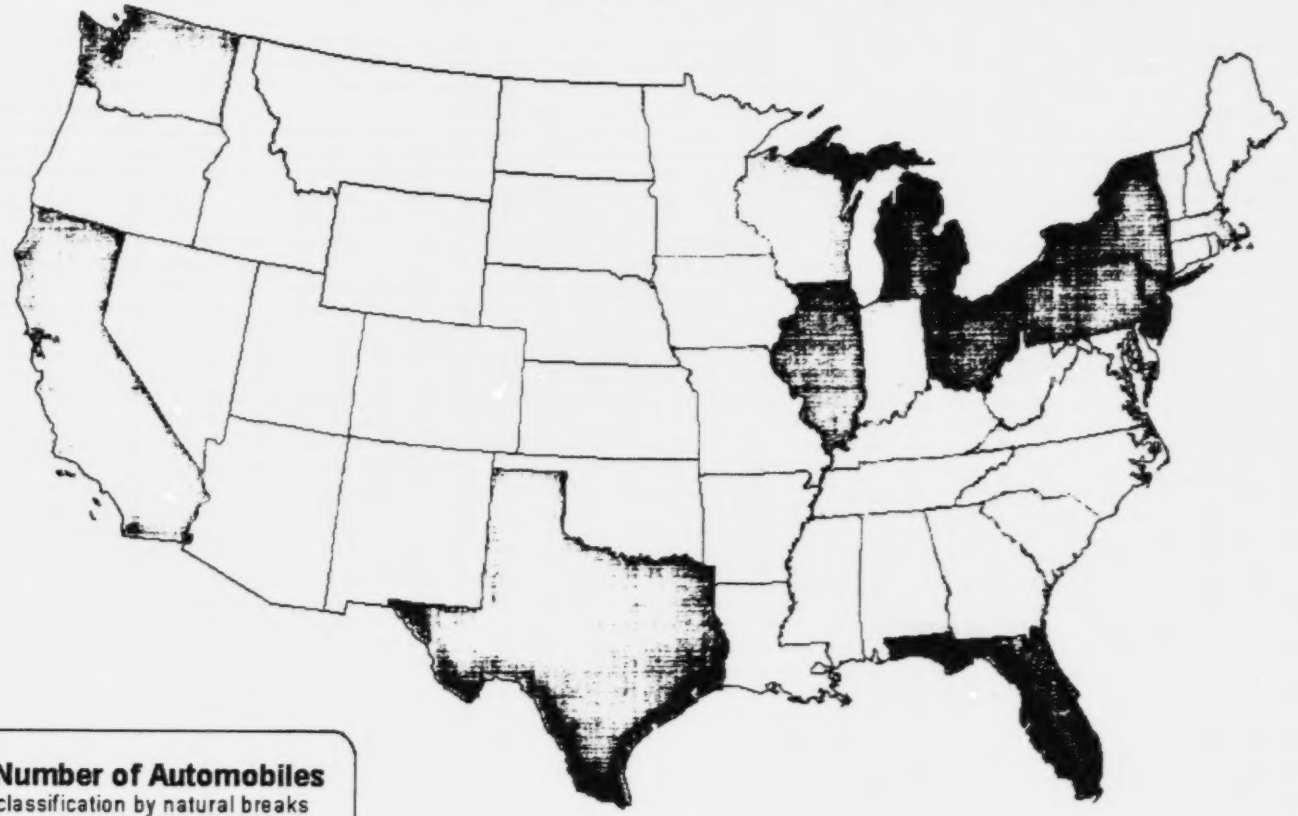
U.S. Automobile Registration



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mapped with ArcView GIS Albers Equal Area Projection

Other essential information includes:

credits for base map

credits for data

map projection

cartographer identification

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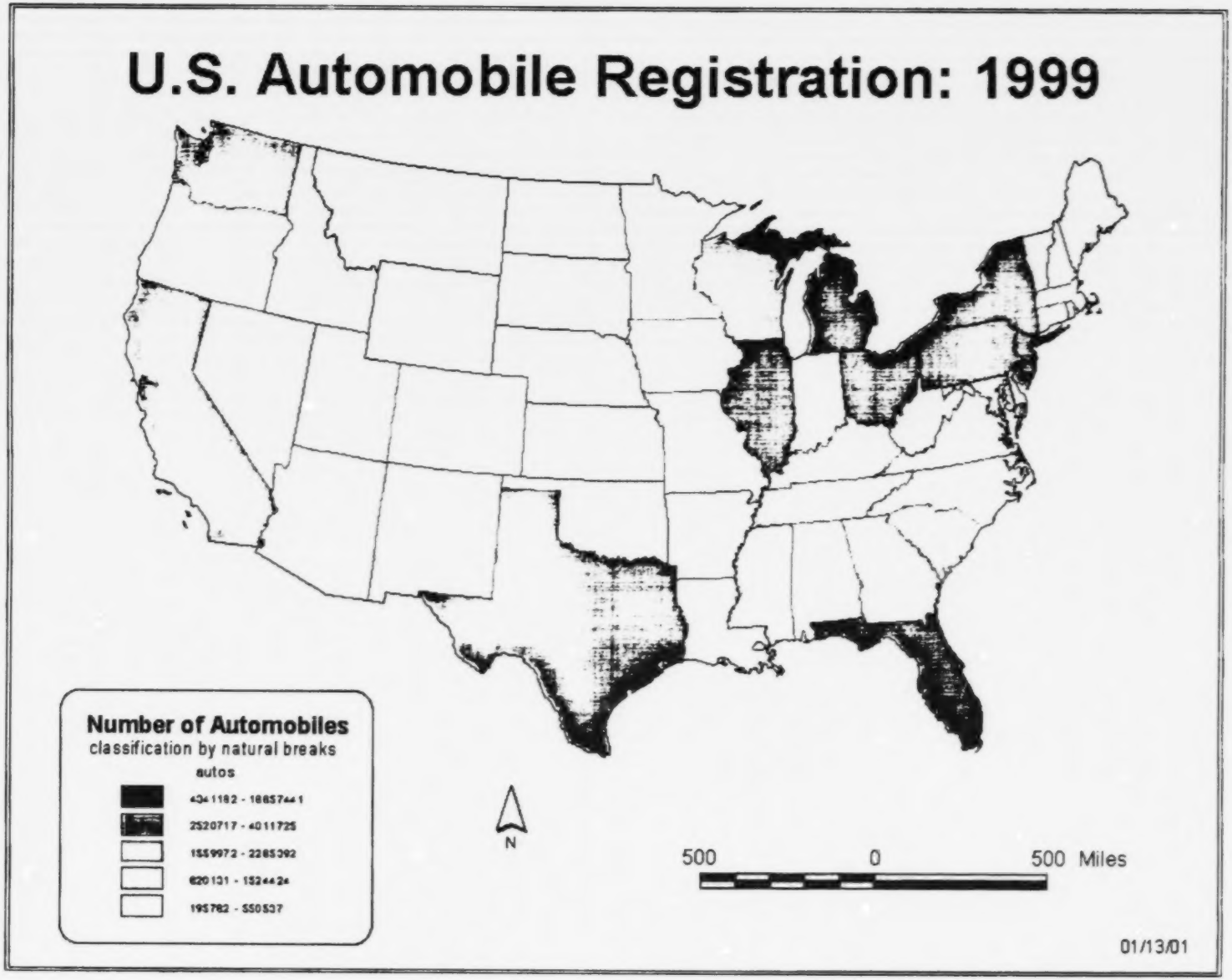

Credits should be sized to be legible but not overly prominent.

The positions should be peripheral.

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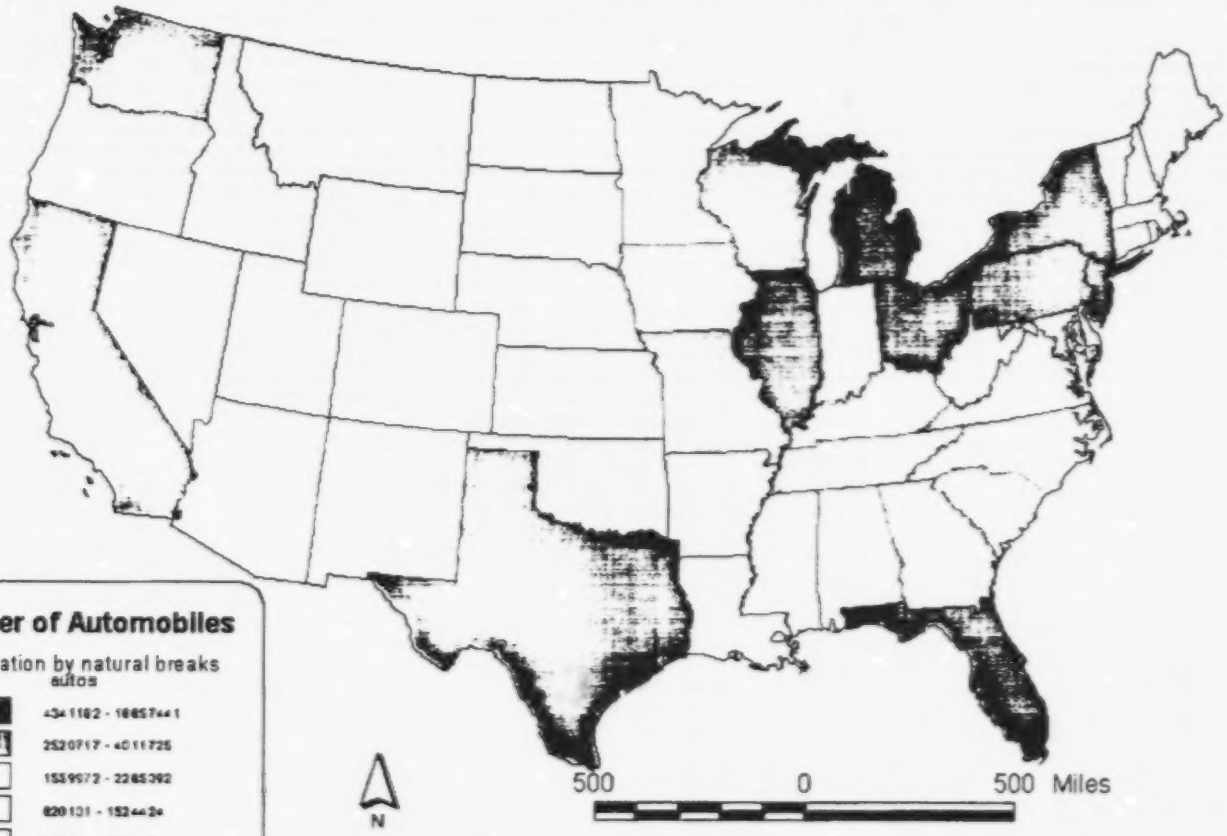

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Excel file format at: http://www.fhwa.dot.gov/////ohim/hs99/excel/mv1.xls
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The choice of map projection is critical.

When spatial distribution over the earth's surface is an issue, an equal area projection must be used.

Most projections do not maintain equal area relations.

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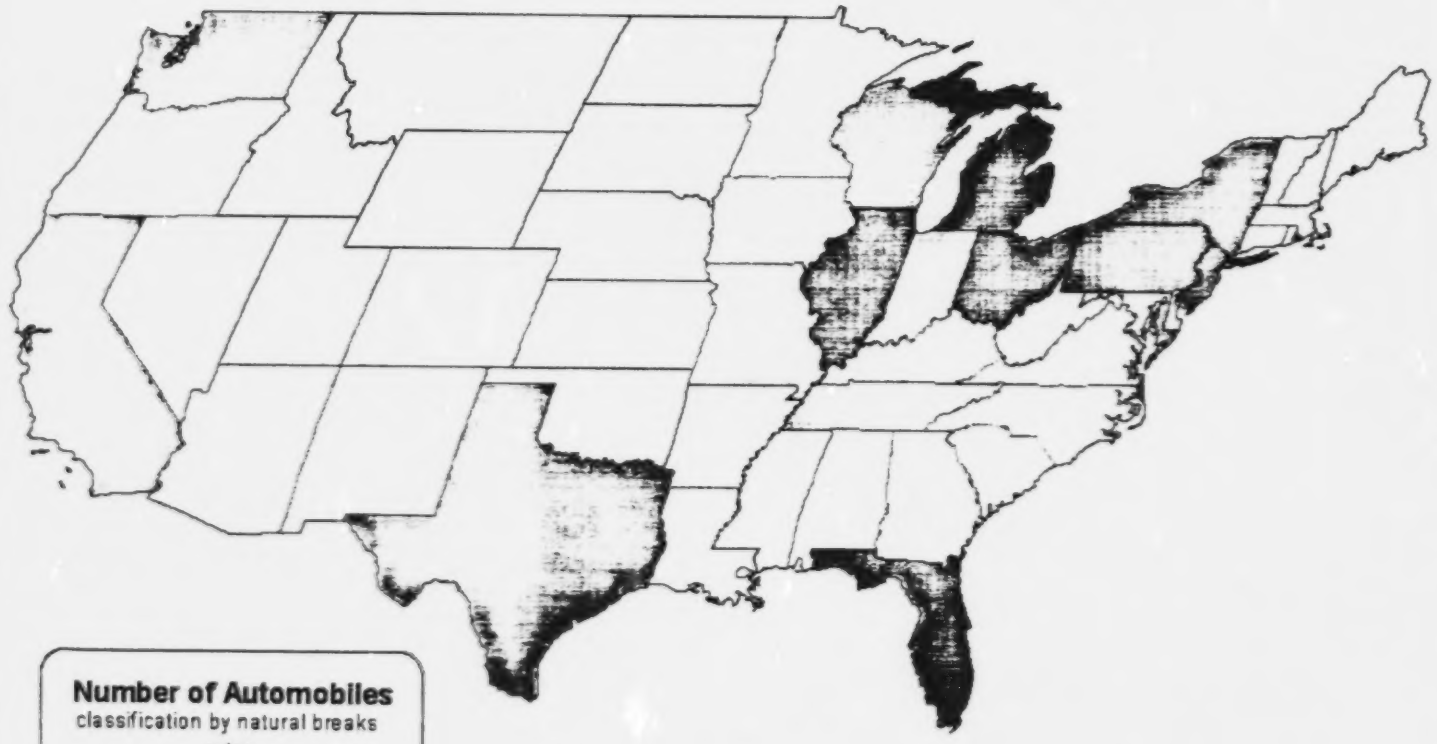

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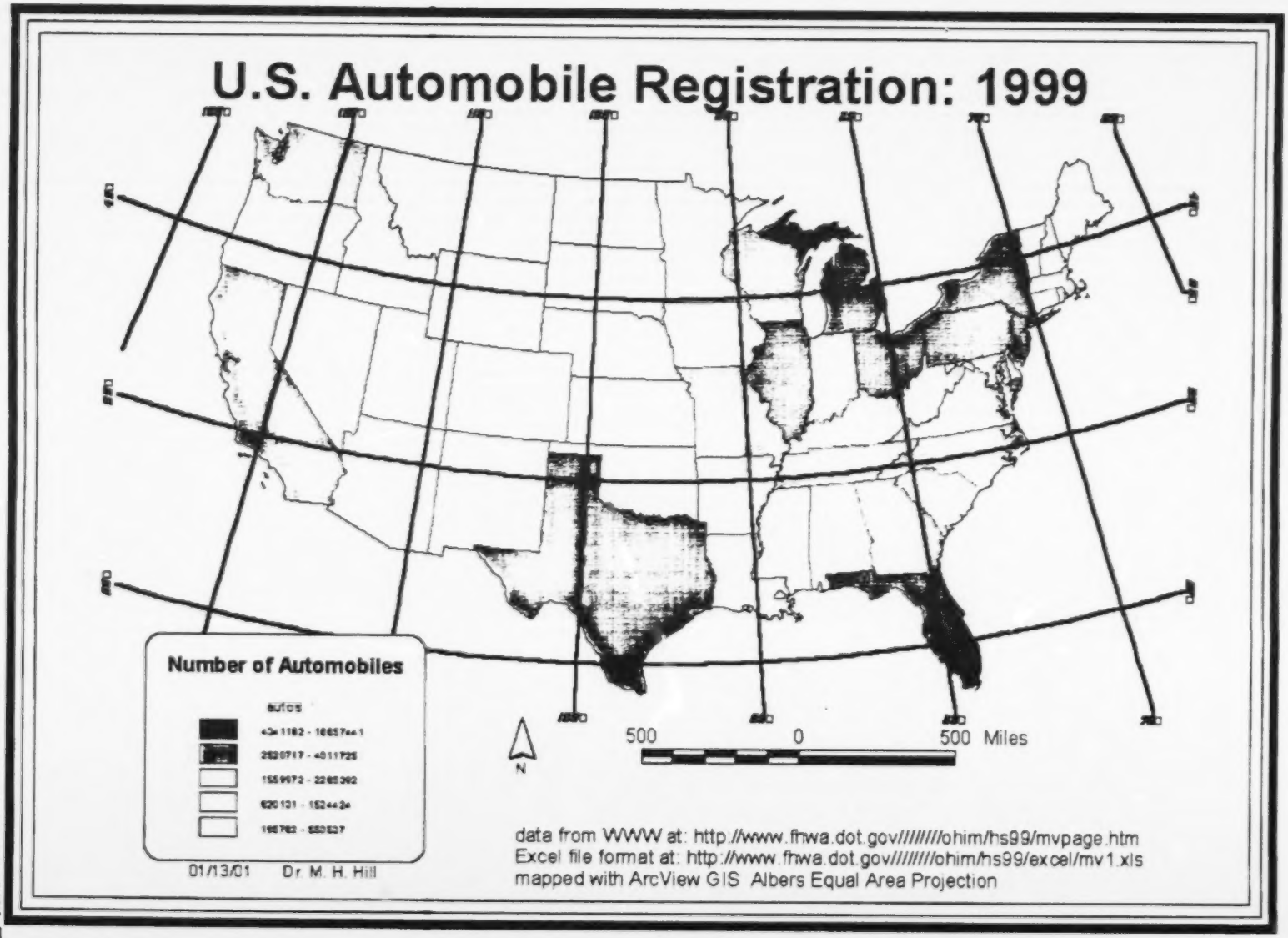
Excel file format at: http://www.fhwa.dot.gov/////////ohim/hs99/excel/mv1.xls
mapped with ArcView GIS Robinson Projection

The graticule or grid ticks should assist in location but not dominate.



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Lettering guidelines state that the map should use:

Only one typeface

Several type families (as needed for differentiation)

Between four to six different font sizes

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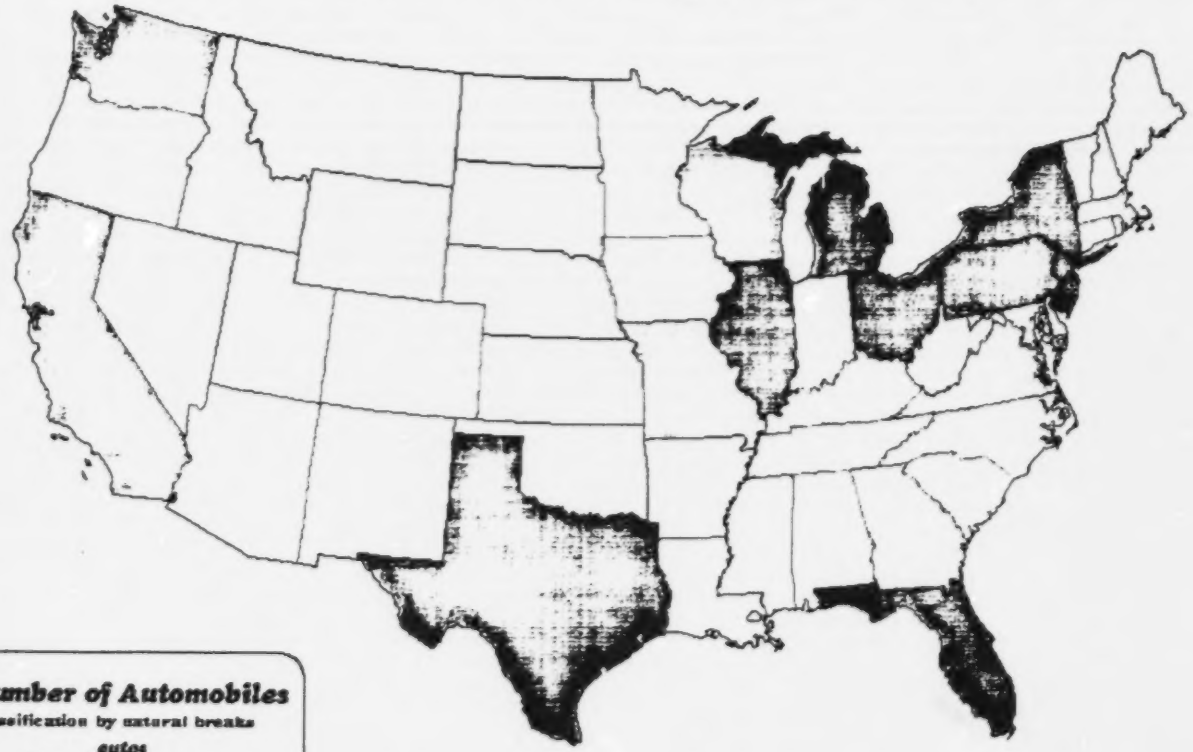

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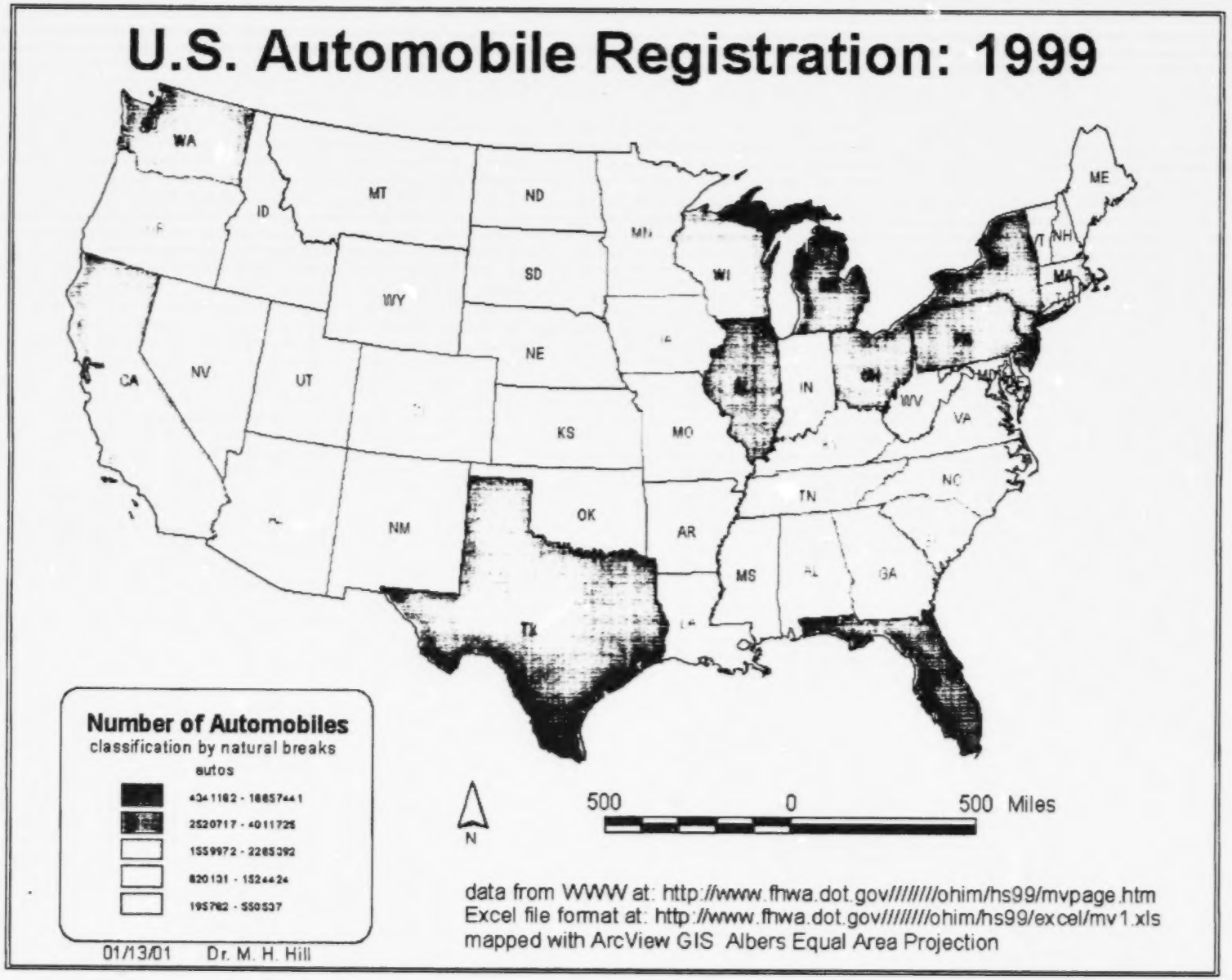
Excel file format at: http://www.fhwa.dot.gov/////////ohim/hs99/excel/mv1.xls
mapped with ArcView GIS Albers Equal Area Projection

Consider the audience, but avoid excessive and unnecessary labels



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Watch for spelling and labeling errors and omissions.

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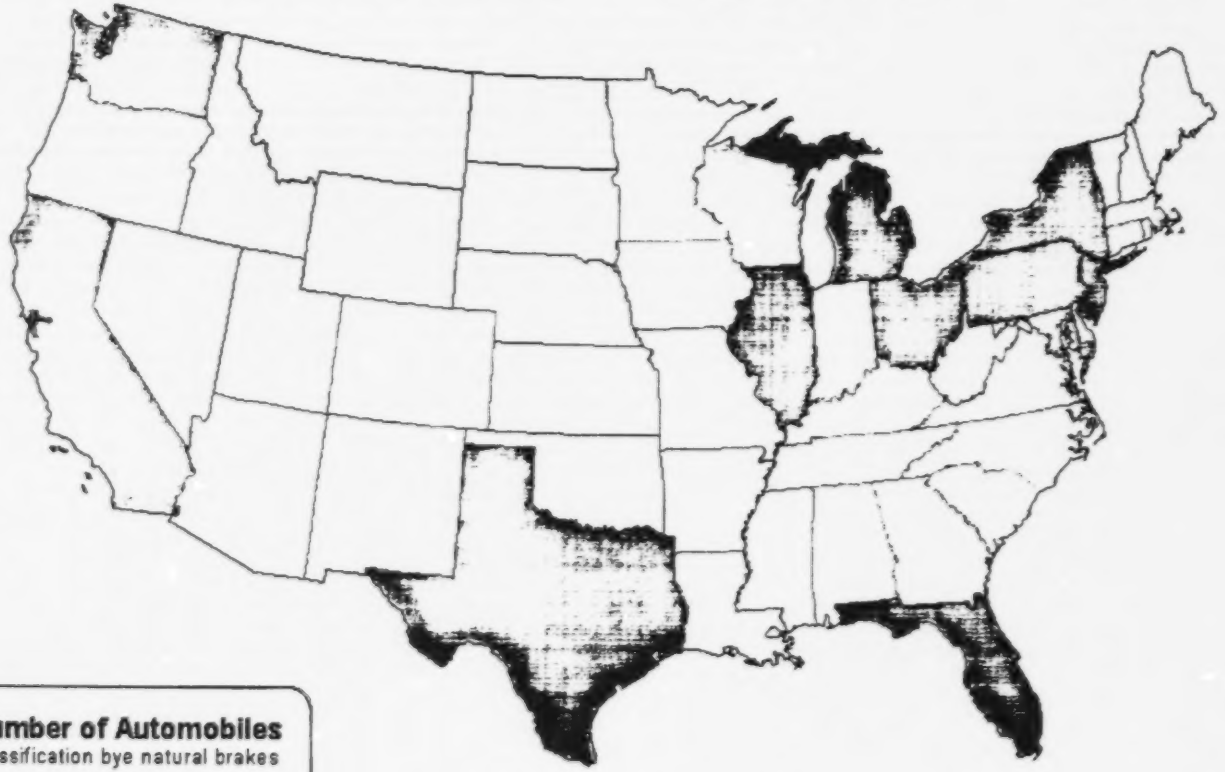

Number of Automobiles
classification bye natural brakes
autos

	4341182 - 18857441
	2520717 - 4011725
	1559972 - 2265392
	620131 - 1524424
	195782 - 550537

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N

500 0 500 Miles

data from WWW at: http://www.fhwa.dot.gov/////ohim/hs99/mvpage.htm
Excell file form at at: http://www.fhwa.dot.gov/////ohim/hs99/excel/mv1.xls
mapped wit ArcView GIS Alberts Equal Are Projectin

Blue lines may be invisible during photographic reproduction.

All lines should be done with drawing instruments and guides with overlapping ends removed.

The only freehand marks might be calligraphy which should use guidelines and planning to assist in consistent sizing and spacing of letters.

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data from WWW at: http://www.fhwa.dot.gov/////ohim/hs99/mvpage.htm
Excel file format at: http://www.fhwa.dot.gov/////ohim/hs99/excel/mv1.xls
mapped with ArcView GIS Albers Equal Area Projection

Two, three, or four different line weights are often desirable to help distinguish differences in line features. The widths need to be recognizable, but the total range must fit within comfortable viewing standards. Guides have been developed to help select appropriate line widths.

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mapped with ArcView GIS Albers Equal Area Projection

Maps must have margins.

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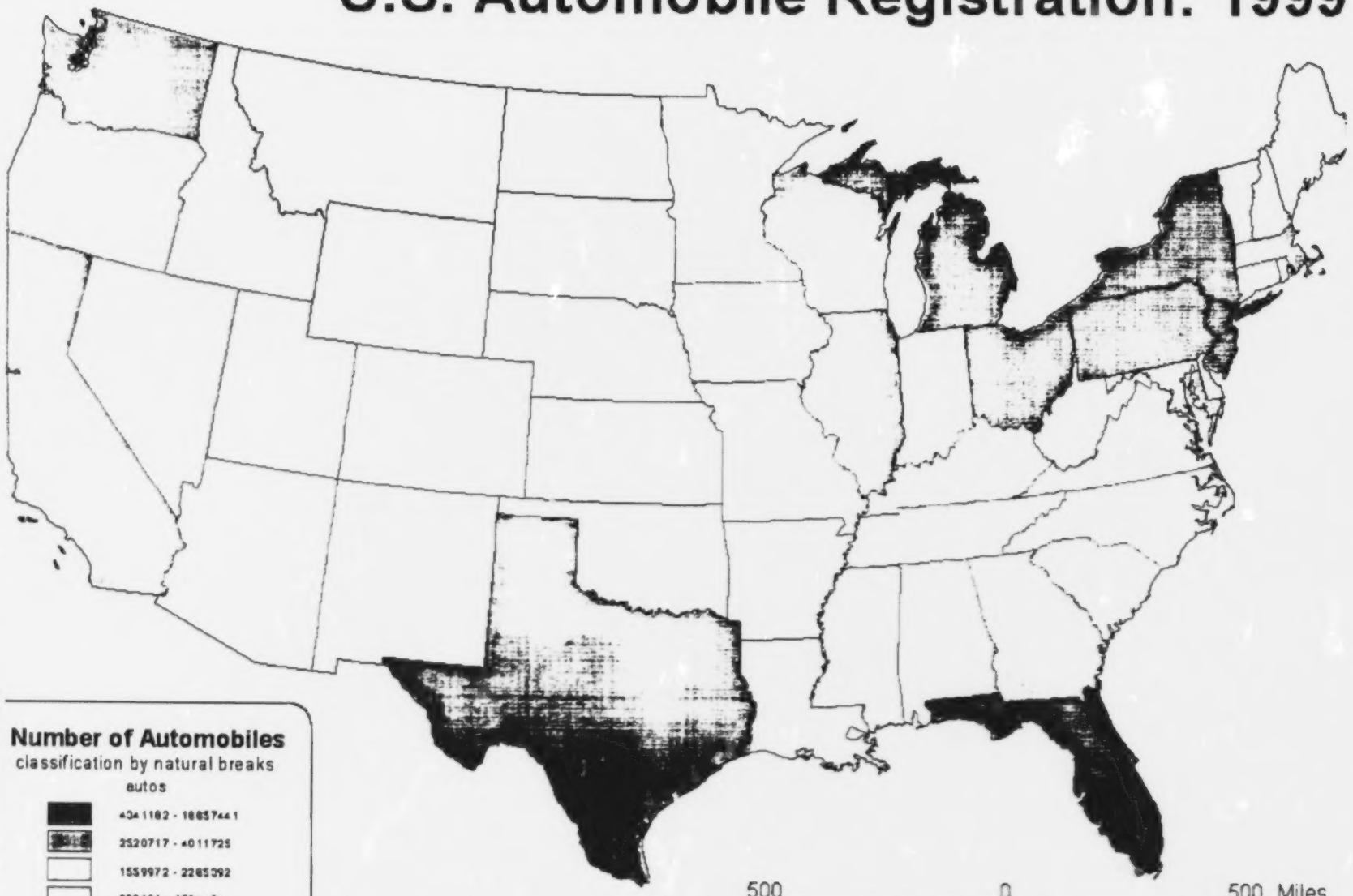

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Excel file format at: http://www.fhwa.dot.gov/////////ohim/hs99/excel/mv1.xls
mapped with ArcView GIS Albers Equal Area Projection

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Neatlines act like frames highlighting the interior.

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Number of Automobiles
classification by natural breaks
autos

	4341162 - 18857441
	2520717 - 4011725
	1559972 - 2265392
	620131 - 1524424
	195782 - 550537

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N

500 0 500 Miles

data from WWW at: http://www.fhwa.dot.gov/////////ohim/hs99/mvpage.htm
Excel file format at: http://www.fhwa.dot.gov/////////ohim/hs99/excel/mv1.xls
mapped with ArcView GIS Albers Equal Area Projection

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The weight and number of neatlines should balance with the boldness of the interior.

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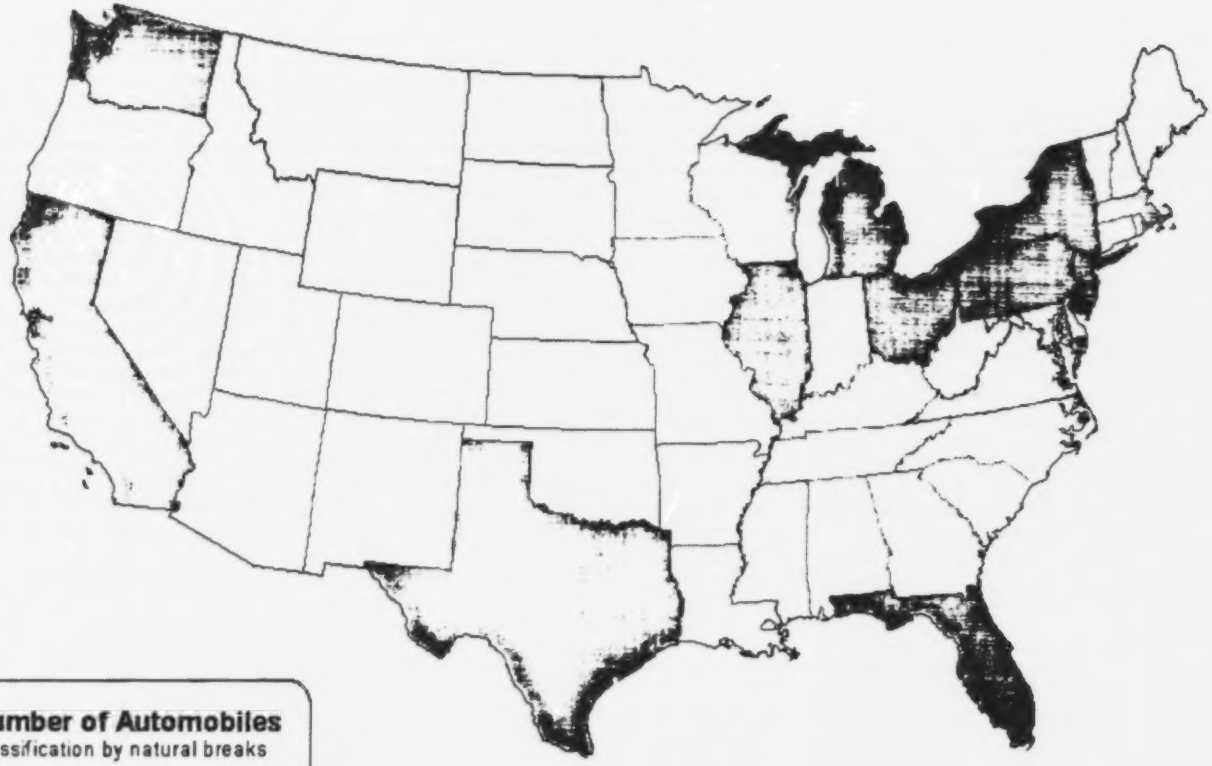

data from WWW at: http://www.fhwa.dot.gov/////ohim/hs99/mvpage.htm
Excel file format at: http://www.fhwa.dot.gov/////ohim/hs99/excel/mv1.xls
mapped with ArcView GIS Albers Equal Area Projection

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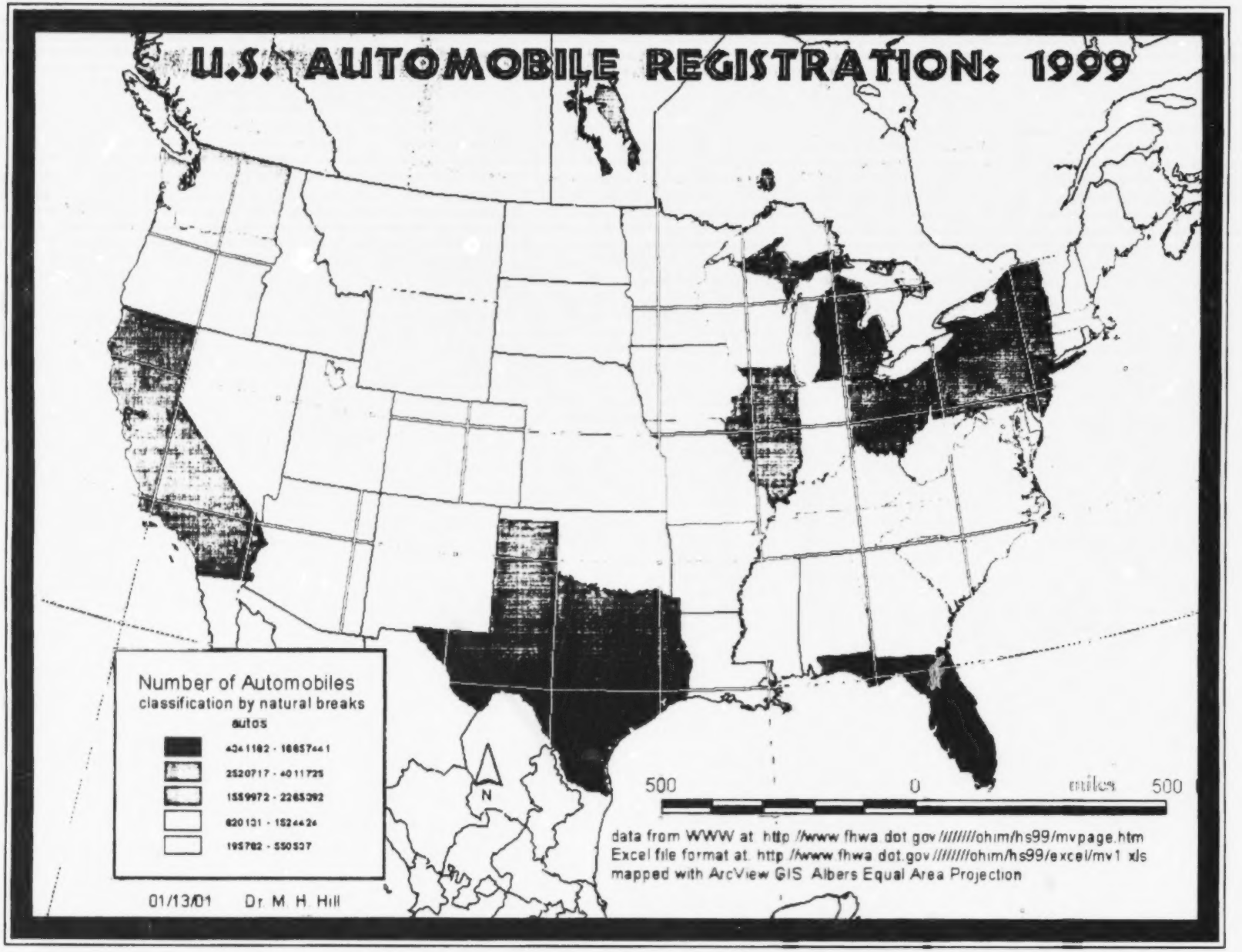
Maps have figure and ground.

The figures must not be lost within the ground.



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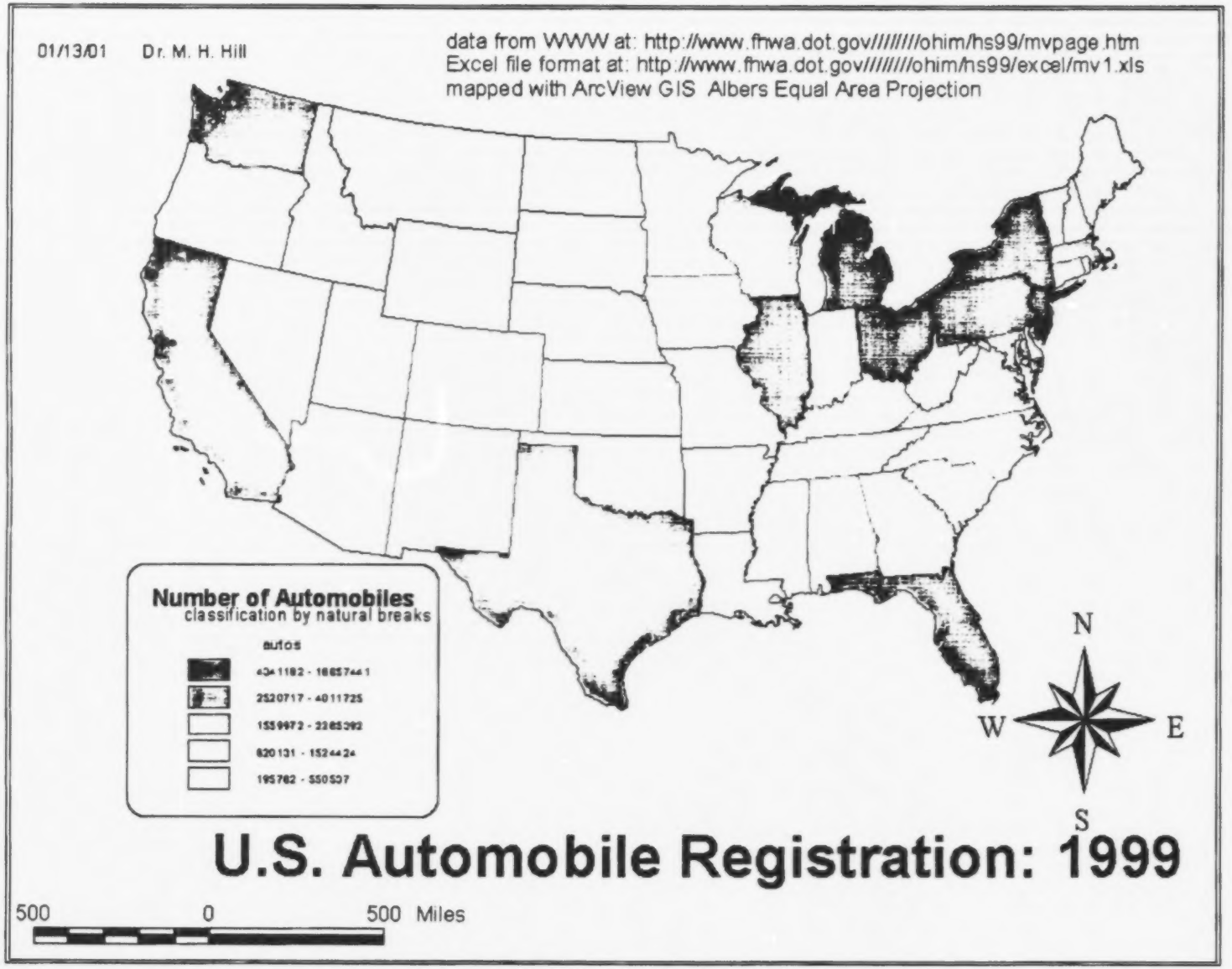
An ordered arrangement of elements is important to the artistic impression of the map.

Alignment and balance are part of this organization.



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The map should not have an excessive amount of blank space.

U.S. Automobile Registration: 1999

Number of Automobiles
classification by natural breaks

autos

	4341162 - 16857441
	2520717 - 4011725
	1559972 - 2285392
	820131 - 1524424
	195782 - 550537

N

500 0 500 Miles

01/13/01 Dr. M. H. Hill

data from WWW at: http://www.fhwa.dot.gov/////////ohim/hs99/mvpage.htm
Excel file format at: http://www.fhwa.dot.gov/////////ohim/hs99/excel/mv1.xls
mapped with ArcView GIS Albers Equal Area Projection

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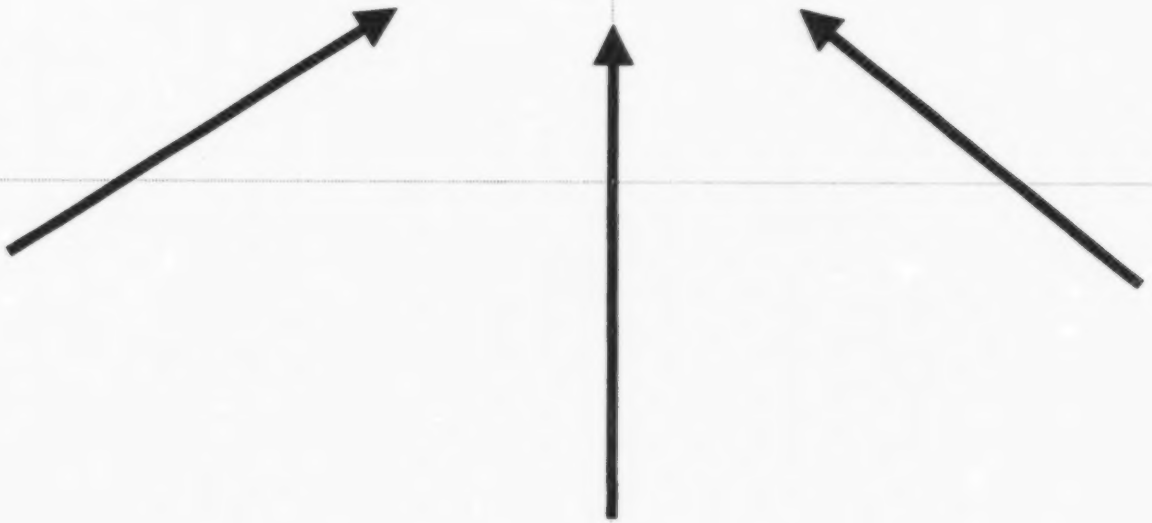
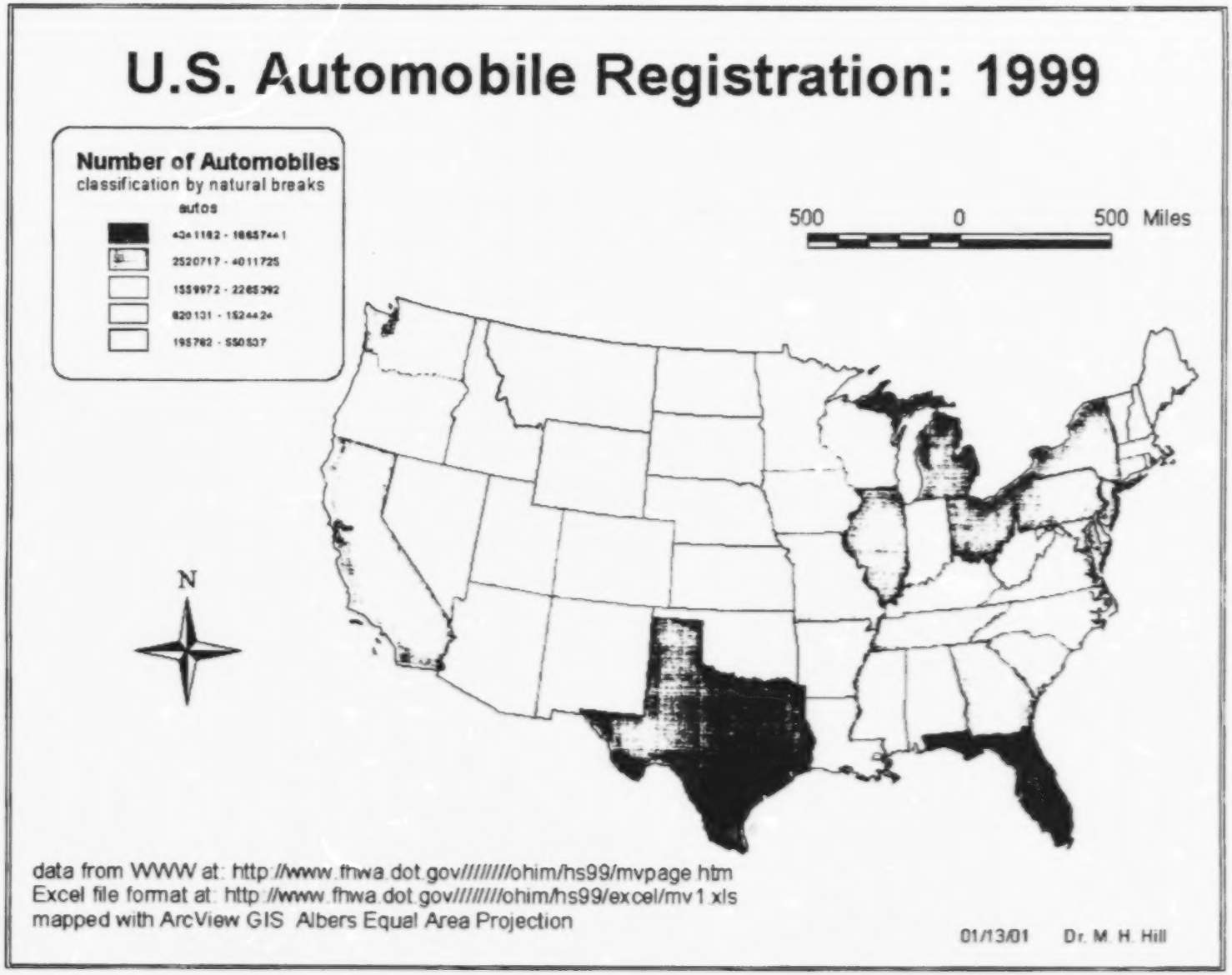
The optical center is located above the center of the page. This is the "strongest" location and should contain the most important map element

THE MAP.





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Visual scanning of the page goes from top left

to the optical center

to the bottom right side of the page.

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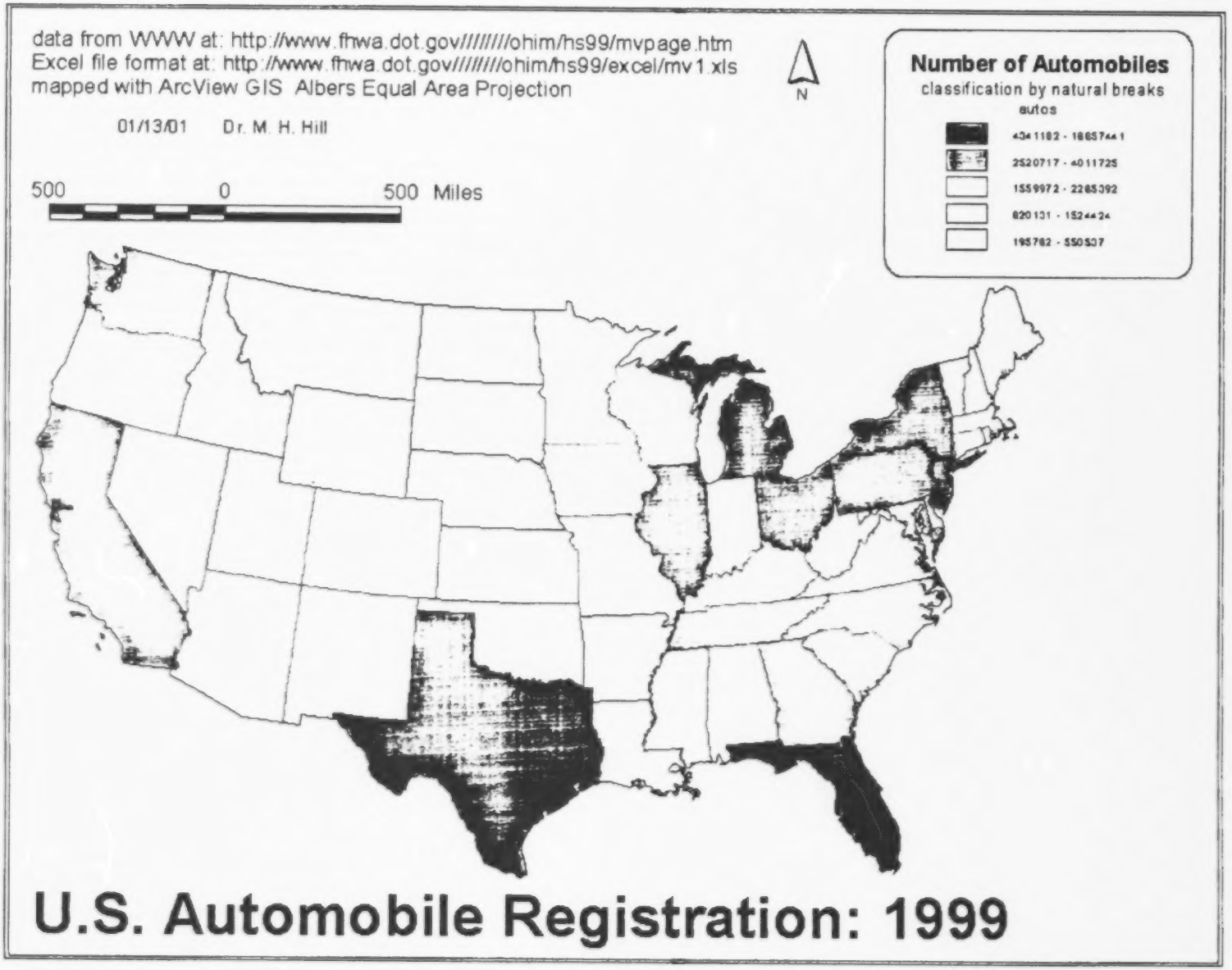
This viewing pattern should be considered when placing elements on the page.



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Most important of all, each map element has a weight. That weight indicates its importance.

The weight is provided through characteristics like size and boldness.

The map,
the title,
and the legend
should be more prominent than the other map elements.

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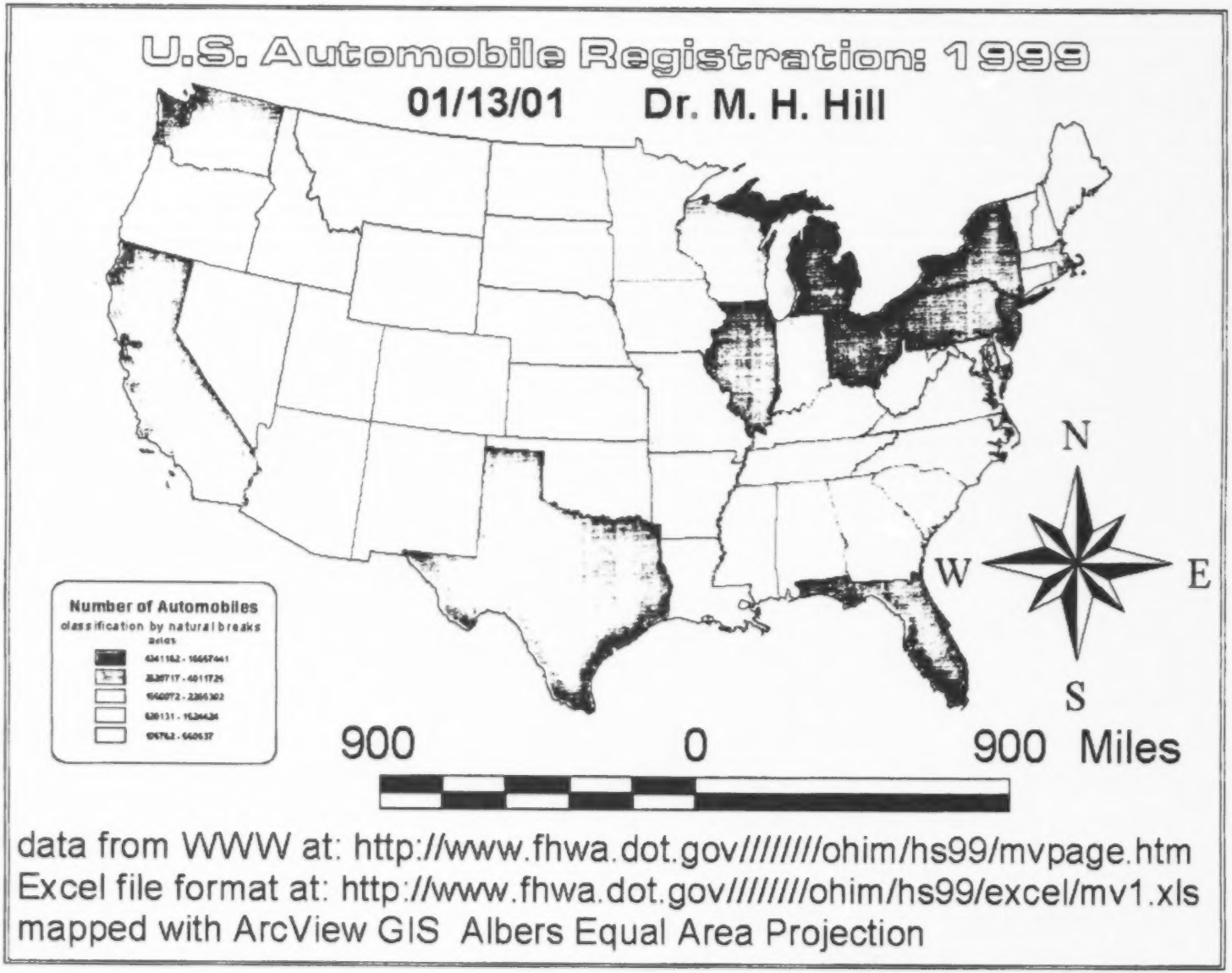
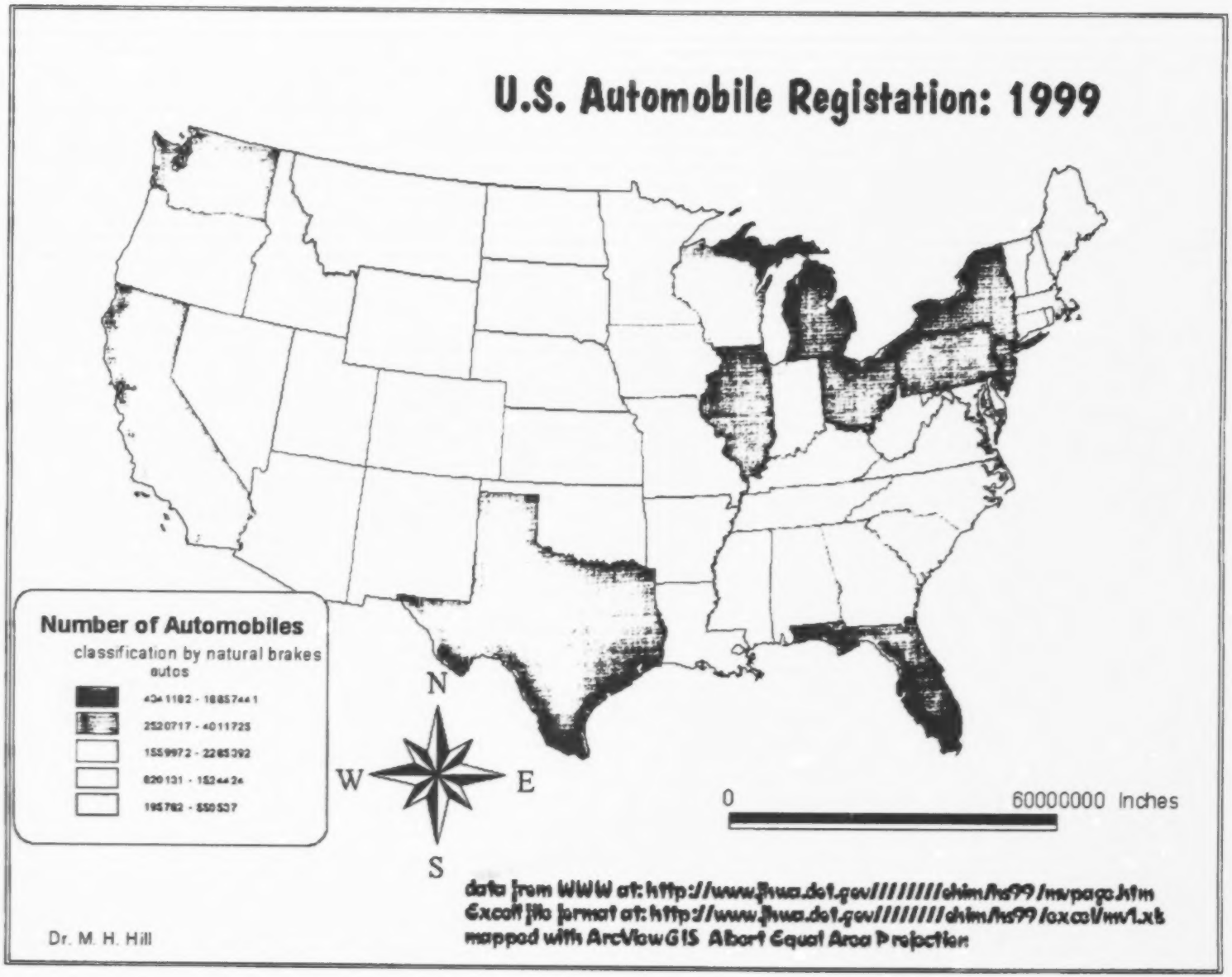


data from WWW at: http://www.fhwa.dot.gov/////////ohim/hs99/mvpage.htm
Excel file format at: http://www.fhwa.dot.gov/////////ohim/hs99/excel/mv1.xls
mapped with ArcView GIS Albers Equal Area Projection

What is wrong with the following map design?



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